



MT-3 RADIO SYSTEMS

MT-3 AM TRANSMITTER MAIN BOARD INSTRUCTION MANUAL

Covers:

A22-VAP130 AM Audio Processor Version 04

A21-TX3-00 TXMAIN/FPB Common Assembly Version 1.7

Copyright © 1998 Daniels Electronics Ltd. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written consent of Daniels Electronics Ltd.

DE™ is a registered trademark of Daniels Electronics Ltd. registered in the United States Patent and Trademark Office.

Issue: 3 Previous Issue: 2

Issue Date: December 98 Previous Issue Date: March 98

Printing Date: N/A

Part No.: IM22-MT3AMTXMN

Daniels Electronics Ltd.
Victoria, BC

PRINTED IN CANADA

Reviewed By:

Quality Assurance:

Larry Freeman

Name

Signature

Date

NOTE:

The user's authority to operate this equipment could be revoked through any changes or modifications not expressly approved by Daniels Electronics Ltd.

The design of this equipment is subject to change due to continuous development. This equipment may incorporate minor changes in detail from the information contained in this manual.

TABLE OF CONTENTS

	Page
1 GENERAL.....	1-1
1.1 Introduction.....	1-1
1.2 Performance Specifications	1-1
1.2.1 General	1-1
1.2.2 Audio Specifications.....	1-2
2 THEORY OF OPERATION	2-1
2.1 MT-3 AM Transmitter Main Board	2-1
2.1.1 General	2-1
2.1.2 Transmitter Push-To-Talk.....	2-1
2.1.2.1 Microphone PTT	2-1
2.1.2.2 PTT With Time-Out-Timer.....	2-2
2.1.2.3 PTT No Time-Out-Timer.....	2-2
2.1.2.4 Optional Relay	2-2
2.1.2.5 PTT Output	2-3
2.1.2.6 PTT Voltage Switching.....	2-3
2.1.2.7 Transmitter Standby Modes.....	2-3
2.1.3 Audio Circuits	2-4
2.1.3.1 Microphone Audio	2-5
2.1.3.2 Received Audio.....	2-5
2.1.4 Channel Selection	2-5
2.1.4.1 Synthesized Transmitter.....	2-5
2.1.4.2 Crystal Controlled Transmitter	2-5
2.1.5 Amplifier Circuits	2-6
2.2 MT-3 Front Panel Board	2-6
2.3 MT-3 AM Audio Processor.....	2-6
2.3.1 General	2-6
2.3.2 Power Requirements.....	2-6
2.3.3 Audio Circuitry.....	2-7
2.3.4 PTT Time-Out-Timer	2-8
3 TRANSMITTER ALIGNMENT.....	3-1
3.1 General	3-1
3.2 Repair Note	3-1
3.3 Printed Circuitboard Numbering Convention.....	3-1
3.4 Recommended Test Equipment List	3-1
3.5 Standard Factory Settings and Jumper Configuration	3-2
3.5.1 MT-3 AM Transmitter Board Factory Configuration	3-2
3.5.2 MT-3 AM Audio Processor Factory Configuration.....	3-3
3.6 MT-3 AM Transmitter Board Alignment	3-3

3.6.1	General.....	3-3
3.6.2	MT-3 AM Transmitter Board Test Points.....	3-4
3.7	Module Installation and Removal.....	3-4
3.8	MT-3 AM Audio Processor Alignment	3-5
3.8.1	General.....	3-5
3.8.2	MT-3 AM Audio Processor Adjustment	3-5
4	TRANSMITTER INTERCONNECT PIN DEFINITIONS	4-1
5	ILLUSTRATIONS AND SCHEMATIC DIAGRAMS	5-1
5.1	MT-3 AM Transmitter Block Diagram	5-1
5.2	MT-3 AM Transmitter Board Electrical Assembly.....	5-3
5.2.1	MT-3 AM Transmitter Main Board Component Layout (Top).....	5-3
5.2.2	MT-3 AM Transmitter Main Board Component Layout (Bottom)...	5-4
5.2.3	MT-3 AM Transmitter Main Board Schematic Diagram	5-5
5.3	MT-3 Front Panel Board.....	5-6
5.3.1	MT-3 Front Panel Board Component Layout	5-6
5.3.2	MT-3 Front Panel Board Schematic	5-7
5.4	MT-3 AM Audio Processor Electrical Assembly	5-8
5.4.1	MT-3 AM Audio Processor Component Layout.....	5-8
5.4.2	MT-3 AM Audio Processor Schematic Diagram.....	5-9
6	PARTS LISTS	6-1
6.1	Transmitter Main Board Parts List.....	6-1
6.1.1	Transmitter Main Board Electrical Parts List	6-1
6.1.2	Transmitter Main Board Mechanical Parts List.....	6-3
6.1.3	MT-3 Front Panel Board Electrical Parts List	6-4
6.2	MT-3 AM Audio Processor Parts List	6-4
6.2.1	MT-3 AM Audio Processor Electrical Parts List.....	6-4
7	REVISION HISTORY	7-1

1 GENERAL

1.1 Introduction

The MT-3 AM Transmitter Main Board integrates the MT-3 Front Panel Board, MT-3 AM Audio Processor, Synthesizer or Crystal Control module and Amplifier module together to make a working MT-3 AM series transmitter (see section 5.1: MT-3 AM Transmitter Block Diagram). The Front Panel Board and the Audio Processor are soldered directly to the Transmitter Main Board while the Amplifier and the Synthesizer or Crystal Control module are frequency band sensitive, plug-in modules. Circuitry and jumpers on the Transmitter Main Board control the operation of the modules as well as the overall operation of the MT-3 transmitter. Power and signal connections are made to the 48 pin type 'F' connector on the rear of the Transmitter Main Board and are routed to the other modules. The front and rear back plates are attached to the Transmitter Main Board and together with the extruded aluminum shell, as discussed in the assembly section of the Transmitter Manual, form the transmitter enclosure.

1.2 Performance Specifications

1.2.1 General

Type:	MT-3 AM Series Transmitter
Compatibility:	VT-3A Series Amplifier, OCT-3 Crystal Oscillator, OST-3 Frequency Synthesizer.
Modulation:	6K00A3 (Amplitude Modulation)
Operating Temperature Range:	-30°C to +60°C, optional - 40°C temperature test.
Operating Humidity:	95% RH (non-condensing) at +25°C.
Operating Voltage:	+13.8Vdc , +9.5 Vdc Regulated.
Front Panel Control:	One 3 position switch <ul style="list-style-type: none">• NORM (repeat mode)• OFF• KEY TX
PTT Activation:	<ul style="list-style-type: none">• Active to ground with or without time-out-timer;• Microphone activated with or without time-out-timer;• Front Panel switch: KEY TX - without time-out-timer;• NORM - with or without time-out-timer.• Isolated (optional relay) with or without time-out-timer.
PTT Time-Out-Timer:	Selectable from 1 sec. to 8 hrs. (factory set 5 min.).

1.2.2 Audio Specifications

Audio Input: -30 to 0 dBm into a 600Ω balanced load.

Audio Response: Flat audio; +1/-3 dB: 300 Hz - 3 kHz

Audio Distortion: Less than 3% -40°C to +60°C at 30% modulation
Less than 5% -40°C to +60°C at 90% modulation

2 THEORY OF OPERATION

2.1 MT-3 AM Transmitter Main Board

2.1.1 General

Switch SW1 on the Front Panel Board is a DPDT switch which controls the operation of the transmitter as discussed in the operations section of the Transmitter Manual. When SW1 is in the 'OFF' position the transmitter is turned off; however, +13.8 Vdc is still present on the Transmitter Main Board as the +13.8 Vdc supply is not switched. When SW1 is in the 'KEYED' position, +9.5 Vdc is supplied to the transmitter circuitry and the transmitter is continuously turned on. When SW1 is in the 'NORM' position, +9.5 Vdc is supplied to the transmitter circuitry and the transmitter can be keyed from several Push-To-Talk inputs.

Refer to section 5.2.3 Transmitter Main Board Schematic Diagram".

2.1.2 Transmitter Push-To-Talk

All three of the Push-To-Talk (PTT) inputs that key the transmitter are active low ($< +2.0$ Vdc). One PTT input is on the front panel microphone connector. The other two PTT inputs: PTT WTO (PTT With Time-Out-Timer) and PTT NTO (PTT No Time-Out-Timer), are on the backplane connector of the transmitter board. If required, the microphone's PTT input can be configured to activate the transmitter's Time-Out-Timer (TOT). An isolated PTT input can be made available by installing an optional relay (RELAY1) and configuring jumpers J2 to J4 so that the relay controls the PTT circuitry.

2.1.2.1 Microphone PTT

Jumper J1 on the MT-3 Front Panel Board configures the microphone's PTT input (MIC PTT) to either bypass or activate the transmitter's TOT. Soldering jumper J1 in the 'x' position (default) selects the MIC PTT NTO line which bypasses the TOT. Soldering J1 to the 'y' position selects the MIC PTT WTO line which activates the transmitter's TOT. When SW1 is in the 'KEYED' position the MIC PTT NTO line is automatically grounded. Refer to Section 5.3.1, "MT-3 Front Panel Board Component Layout" for the location of jumper J1.

2.1.2.2 PTT With Time-Out-Timer

Pins B10 and Z10 of the backplane connector are the PTT WTO input. When the PTT WTO signal, which is normally high, falls below +2.0 Vdc, the transmitter is keyed. The transmitter is disabled when the PTT WTO input rises above +2.3 Vdc or if the TOT's time-out period is exceeded. If the time-out period is exceeded the PTT WTO input must go high (>+2.3 Vdc) and then low again in order to rekey the transmitter.

The PTT WTO threshold of approximately +2 Vdc (0.3 Vdc hysteresis) is set by U1a, R1, R2, R3, R4, R9, and R10 while diodes D1 and D2 provide overvoltage protection for U1a. The PTT WTO signal output from U1a is 'AND'ed with the MIC PTT WTO by U2a. When either the PTT WTO or the MIC PTT WTO is activated the output of U2a goes low which triggers the transmitter's TOT located on the MT-3 Audio Processor. The TOT's output is 'AND'ed with the MIC PTT NTO signal (U2c) and the PTT NTO signal (U2d). When any one of the preceding three signals (TOT's output, MIC PTT NTO, PTT NTO) go low the transmitter is activated by transistors Q1 to Q7 which switch power to the various modules.

2.1.2.3 PTT No Time-Out-Timer

Pins B14 and Z14 of the backplane connector are the PTT NTO input. When the PTT NTO signal, which is normally high, falls below +2.0 Vdc, the transmitter is keyed. As long as the PTT NTO signal remains below +2.0 Vdc the transmitter will remain keyed. The transmitter is disabled when the PTT NTO signal rises above +2.3 Vdc.

The PTT NTO threshold of approximately +2 Vdc (0.3 Vdc hysteresis) is set by U1b, R5, R6, R7, R8, R9, and R10 while diodes D3 and D4 provide overvoltage protection for U1b. The PTT NTO signal is 'AND'ed with the output of U2c (MIC PTT NTO signal 'AND'ed with the TOT output) by U2d. When the output of U2d goes low the transmitter is activated by transistors Q1 to Q7 which switch power to the various modules.

2.1.2.4 Optional Relay

The transmitter's PTT circuitry can be completely isolated by installing RELAY1. Jumpers J2 to J4 configure the relay to provide an isolated PTT input for either the PTT WTO line or PTT NTO line. The isolated PTT input is enabled by energizing the relay. The transmitter board will accept any of the Aromat TF2E line relays. These relays are DPDT, single side stable, and have coil voltages ranging from +3 Vdc to +48 Vdc. Only one set of relay contacts are used to activate the PTT circuitry, the other set of contacts are brought out to the backplane connector.

To configure the isolated input for PTT WTO operation jumpers J2, J4 must be in the 'y' position, J3 must be in the 'x' position. In this mode, pins B10 and Z10 no longer function as the PTT WTO input; however, pins B14 and Z14 continue to function as the normal PTT NTO input.

To configure the isolated input for PTT NTO operation jumpers J2, J4, must be in the 'x' position J3 must be in the 'y' position. In this mode, pins B14 and Z14 no longer function as the PTT NTO input; however, pins B10 and Z10 continue to function as the normal PTT WTO input.

2.1.2.5 PTT Output

Pin B24 on the backplane connector is an open drain output (Q9) which is pulled low anytime the transmitter is keyed and the synthesizer is locked. A crystal controlled transmitter does not have a locked condition so pin B24 is pulled low anytime the transmitter is keyed. Q9, an N-channel MOSFET capable of sinking currents up to 2 Amps, is activated by Q8 which is activated by the Qualified PTT signal (JS2-6) of the synthesizer or crystal control module. The Qualified PTT signal also controls the LED ENA line for diode D1 on the front panel board and enable line for the VT-3A Amplifier Module (JP1-1).

2.1.2.6 PTT Voltage Switching

The PTT voltage switching circuitry is comprised of transistors Q1 through Q7 and the associated resistors. The base of Q1 is driven by the output of U2d which is the combined PTT signal from all of the PTT inputs. When the transmitter is keyed, Q1 is turned off and subsequently transistors Q3, Q4, and Q6 are turned on. Transistors Q3, Q4, and Q6 provide three different functions:

- Q3 provides the active low signal for the synthesizer or crystal module PTT input;
- Q4 turns on Q5 which turns on the +9.5 Vdc Switched supply;
- Q6 turns on Q7 which turns on the +9.5 Vdc PTT Switched supply.

The '+9.5 Vdc Switched' supply (Q5) can also be activated by installing jumper J6 or by externally grounding the TX Standby Line (pins B12 and Z12). The '+9.5 Vdc PTT Switched' supply and the '+9.5 Vdc Switched' supply both provide +9.5 Vdc but depending on how jumpers J6, J7 and J18 are configured the transmitter's standby mode will change.

2.1.2.7 Transmitter Standby Modes

The VT-3A130 Transmitter has four different standby modes that trade-off standby current consumption for start-up speed. The standby modes are determined by three jumpers: jumper J6 which always turns on the '+9.5 Vdc Switched' supply, jumper J7 which selects the power source for the MT-3 AM Audio Processor and jumper J18 which selects the enable line for the OST-3A128 Synthesizer or OCT-3 Crystal Control Module.

The actual current and start-up time may depend on the frequency controlled source (crystal or synthesizer) and amplifier module. The current and start-up times given below are representative values intended only as a guideline.

- MODE 1:** Jumper J6 out
 - the audio processor is switched by a PTT signal
 - the synthesizer or crystal module is switched by a PTT signal
 - standby current: Synthesized - typically 13 mA
 Crystal Controlled - typically 6 mA
 - start-up time: Synthesized - typically 40 ms
 Crystal Controlled - typically 40 ms

- MODE 2:** Jumper J6 in, jumper J7 in the 'y' position, jumper J18 in the 'x' position
 - the audio processor is switched by a PTT signal
 - the synthesizer or crystal module is enabled all of the time
 - standby current: Synthesized - not used in this mode
 Crystal Controlled - typically 6 mA
 - start-up time: Synthesized - not used in this mode
 Crystal Controlled - typically 40 ms

- MODE 3:** Jumper J6 in, jumper J7 in the 'x' position, jumper J18 in the 'y' position
 - the audio processor is enabled all of the time
 - the synthesizer or crystal module is switched by a PTT signal
 - standby current: Synthesized - typically 19 mA
 Crystal Controlled - typically 11 mA
 - start-up time: Synthesized - typically 40 ms
 Crystal Controlled - typically 8 ms

- MODE 4:** Jumper J6 in, jumper J7 in the 'x' position, jumper J18 in the 'x' position
 - the audio processor is enabled all of the time
 - the synthesizer or crystal module is enabled all of the time
 - standby current: Synthesized - typically 163 mA
 Crystal Controlled - typically 23 mA
 - start-up time: Synthesized - typically 12 ms
 Crystal Controlled - typically 8 ms

2.1.3 Audio Circuits

All of the audio signal conditioning (e.g. limiting, filtering) is performed by the MT-3 AM Audio Processor. The transmitter board routes the audio lines from the backplane connector to the audio processor. The audio lines routed to the audio processor are: a 600 ohm balanced input (pins B18 and Z18), and a MIC AUDIO from the MT-3 FRONT PANEL BOARD. It is here that the MIC audio is processed in the same manner as the 600 ohm balanced audio.

The audio processor's balanced input pins are isolated from pins B18 and Z18 by a transformer (T1). Two audio outputs from the MT-3 AM Audio Processor are routed to the VT-3A130 Amplifier.

2.1.3.1 Microphone Audio

Normally the audio from a transmitter's microphone is transmitted by that transmitter; however, the Transmitter Main Board can be configured by the MIC IN and MIC OUT lines so that the audio from an external microphone modulates transmitter. The configuration of the MIC IN (pin Z4) and MIC OUT (pin B4) lines on the MT-3 Transmitter Board are controlled by jumpers J16 and J17 respectively. Jumper J16 selects the audio source for the MT-3 AM Audio Processor's microphone input. Jumper J17 is used to enable or disable the MIC OUT line. Normally the transmitter's microphone is selected (J16 in the 'x' position) and the MIC OUT line is enabled (J17 is installed).

2.1.3.2 Received Audio

Pin B20 is the audio input from the transmitter's corresponding receiver. The default setting for this line is to have it AC coupled (Jumper J9 is out) and directly connected to the front panel board RX AUDIO line.

2.1.4 Channel Selection

2.1.4.1 Synthesized Transmitter

Eight backplane connections are used to communicate with the synthesizer unit. Pins D28, D30, and D32 are used (in house) to program the synthesizer. Channel select lines (pins D20, D22, D24, and D26) are used once the synthesizer is programmed to select one of 16 channels. If the channel select lines are all low (channel 0) the channel for the synthesizer is read from switches FSW1 (most significant), FSW2, FSW3, and FSW4 (least significant). Since the resulting frequency is dependent on the transmitter model, refer to the section on frequency selection in the Transmitter Manual or to the channel designation tables for that particular transmitter.

2.1.4.2 Crystal Controlled Transmitter

The crystal control module is a direct replacement for the synthesizer module and therefore uses the same connections as the synthesizer to connects to the MT-3 AM Transmitter Main Board. The channel select lines and switches FSW1 to FSW4 are not used by the crystal control module as the transmitter's operating frequency is determined by the crystal control module's crystal frequency. A frequency multiplication factor, described in the manual for this module, relates the crystal frequency to the operating frequency .

2.1.5 Amplifier Circuits

The MT-3A series Amplifier has 5 connections that are cabled to the transmitter board: +13.8 Vdc, +9.5 Vdc, Enable, Mod and Gnd. The +13.8 Vdc supply (JP1-3) is always on while the +9.5 Vdc supply (JP1-2) is always switched by a PTT signal. The enable line (JP1-1) is active low and is controlled by the Qualified PTT signal from the synthesizer. Jumpers J12, J13, J14, and J15 are not installed.

2.2 MT-3 Front Panel Board

The MT-3 Front Panel Board is a subsection of the MT-3 AM Transmitter Board which is used to mount the front panel switch, diode, and microphone connector. The main purpose of the board is to eliminate a wiring harness for the front panel components. Jumper J1, located on the rear of the circuitboard, is used to select whether or not the MIC PTT line activates the transmitter's TOT:

- Jumper J1: 'x' position MIC PTT NTO no time-out-timer (factory setting)
 'y' position MIC PTT WTO with time-out-timer

Refer to section 5.3.2 "MT-3 Front Panel Board Schematic Diagram".

2.3 MT-3 AM Audio Processor

2.3.1 General

The MT-3 AM Audio Processor is a versatile circuitboard that can provide several types of audio processing. The module also has an on-board programmable push-to-talk (PTT) time-out-timer (TOT) on an attached circuitboard. A continuous +9.5 Vdc supply and a continuous +13.8 Vdc supply together with a switched +8.0 Vdc supply are required to power the module. Refer to section 5.4.1 "MT-3 AM Audio Processor Component Layout" and to section 5.4.2 "MT-3 AM Audio Processor Schematic Diagram" for component location and designation references.

2.3.2 Power Requirements

The audio processor can be configured for continuous audio standby or for switched audio standby by the Transmitter Main Board. If fast audio risetime is desired, the transmitter should be operated in standby mode 3 or 4 as specified in section 2.1.2.7. The current for the associated TOT is approximately 4 mA when the transmitter is keyed.

2.3.3 Audio Circuitry

The MT-3 AM Tx Audio Processor refer to section 5.4.2 "MT-3 AM Audio Processor Schematic Diagram" has two audio inputs (Microphone input and Balanced input) which can be used to modulate the transmitter. The input signals are combined by R2 and R17 at a compandor U1. U1b controls the input level and makes gain inversely proportional to the input level (say a 20 dB drop in input level will produced a 20 dB increase in gain). The output will remain fixed at a constant level without clipping and distortion. (Automatic Level Control) The input signals are adjusted by the pots R1, R16. The variable gain cell in U1a is used as a voltage-controlled amplifier so that if the power supply (13.8Vdc) has changed the output level will change in order to keep the modulation of the RF output signal at the same level. The gain control can be adjust by the pot R4. (Automatic Modulation Control) The audio signal then amplifies and filters at U2. The output signal is adjusted by the pot R9.

2.3.4 PTT Time-Out-Timer

The PTT time-out-timer (TOT) is a relatively independent circuitry located on the Transmitter Board. The TOT is powered from the continuous +9.5 Vdc supply (J34) and is programmable for various time-out periods. The TOT input is normally high and in this state the timer is disabled. When the input trigger level falls below +2.0 Vdc, the timer is activated, and the transmitter is keyed. If the input trigger rises above +2.4 Vdc or if the time-out period is exceeded, the output trigger will go high, disabling the transmitter. If the time-out period is exceeded, the TOT input trigger must go high and then low again in order to rekey the transmitter.

The time-out duration is jumper selectable from 1 second to 8 hours. The table below shows the time-out duration in minutes for the various jumper settings which are listed as enabled (E: jumper shorted - in) or disabled (D: jumper left open - out). The standard factory setting of 5 minutes is shown in bold text in the table below.

D = DISABLED (no solder jumper installed), E = ENABLED (solder jumper installed). Bold text represents default settings.

				TIME-OUT DURATION (MINUTES)		
				JU26= E	JU26= D	JU26= E
JU32	JU31	JU29	JU28	JU27= D	JU27= E	JU27= E
E	E	E	E	0.01	0.01	0.01
E	E	E	D	0.02	0.03	0.01
E	E	D	E	0.04	0.06	0.02
E	E	D	D	0.08	0.12	0.05
E	D	E	E	0.15	0.23	0.10
E	D	E	D	0.31	0.47	0.19
E	D	D	E	0.62	0.94	0.38
E	D	D	D	1.25	1.88	0.75
D	E	E	E	2.5	3.75	1.5
D	E	E	D	5.0	7.5	3.0
D	E	D	E	10	15	6.0
D	E	D	D	20	30	12
D	D	E	E	40	60	24
D	D	E	D	80	120	48
D	D	D	E	160	240	96
D	D	D	D	320	480	192

3 TRANSMITTER ALIGNMENT

3.1 General

Transmitter alignment is simplified by using an M-3 Subrack, SM-3 System Monitor, and RF extender cable to provide transmitter power and signal interconnection. Alternatively, +9.5 Vdc and +13.8 Vdc may be applied directly to a transmitter module through positive connection for the +9.5 Vdc to pins B6 and Z6, for the +13.8 Vdc to pins B2 and Z2, and negative connection to pins B30, Z30, B32, and Z32. Transmitter balanced audio (600 Ω) is available at pins B18 and Z18.

3.2 Repair Note

MT-3 Transmitter modules are mainly made up of surface mount devices which should not be removed or replaced using an ordinary soldering iron. Removal and replacement of surface mount components should be performed only with specifically designed surface mount rework and repair stations complete with ElectroStatic Dissipative (ESD) protection.

3.3 Printed Circuitboard Numbering Convention

To ease troubleshooting and maintenance procedures, Daniels Electronics Limited has adopted a printed circuitboard (PCB) numbering convention in which the last two digits of the circuitboard number represent the circuitboard version. For example:

- PCB number 43-912010 indicates circuitboard version 1.0;
- PCB number 50002-02 indicates circuitboard version 2.0.

All PCB's manufactured by Daniels Electronics are identified by one of the above conventions.

When removing Surface Mount Solder Jumpers, it is recommended to use solder braid in place of manual vacuum type desoldering tools when removing jumpers. This will help prevent damage to the circuitboards.

3.4 Recommended Test Equipment List

Alignment of the complete transmitter requires the following test equipment or its equivalent. It is assumed that any adjustment of the Transmitter Main Board will also involve the other modules.

Dual Power Supply:	Regulated +9.5 Vdc at 2 A. Regulated +13.8 Vdc at 2 A - Topward TPS-4000
Oscilloscope / Multimeter:	Fluke 97 Scopemeter
Current Meter:	Fluke 75 Multimeter

Radio communications test set : Marconi Instruments 2955R
 VSWR 3:1 mismatch load: JFW 50T-035-3.0:1
 Alignment Tool: Johanson 4192

It is recommended that the radio communications test set be frequency locked to an external reference (WWVH, GPS, Loran C) so that the high stability oscillator may be accurately set to within its ± 1 ppm frequency tolerance.

3.5 Standard Factory Settings and Jumper Configuration

Standard factory settings and the associated jumper configuration for each module of the MT-3 AM series transmitter are given below.

3.5.1 MT-3 AM Transmitter Board Factory Configuration

The MT-3 AM Transmitter Main Board is factory configured as follows:

- Transmitter standby mode 3
- Optional relay not installed.

The corresponding jumper settings are:

•Jumper J2:	'x' position	Optional relay configuration
•Jumper J3:	not installed	Optional relay configuration
•Jumper J4:	'y' position	Optional relay configuration
•Jumper J6:	installed	Transmitter standby mode select - Mode 3
•Jumper J7:	'x' position	Audio processor standby mode select
•Jumper J9:	not installed	Receiver audio ac/dc input coupling
•Jumper J12:	not installed	Not applicable
•Jumper J13:	not installed	Not applicable
•Jumper J14:	not installed	Not applicable
•Jumper J15:	not installed	Not applicable
•Jumper J16:	'x' position	Microphone configuration
•Jumper J17:	installed	Microphone output line
•Jumper J18:	'y' position	Synthesizer or crystal module standby mode select
•Jumper J19:	'x' position	600 Ω audio transformer bypass
•Jumper J20:	'x' position	600 Ω audio transformer bypass
•Jumper J21:	not installed	+8 Vdc audio processor supply bypass
•Jumper J22:	'x' position	600 Ω audio transformer bypass
•Jumper J23:	'x' position	600 Ω audio transformer bypass
•Jumper J24:	not installed	Not applicable
•Jumper J25:	'y' position	AM Modulation mode
•Jumper J26:	installed	TOT configuration

•Jumper J27:	not installed	TOT configuration
•Jumper J28:	not installed	TOT configuration
•Jumper J29:	installed	TOT configuration
•Jumper J31:	installed	TOT configuration
•Jumper J32:	not installed	TOT configuration
•Jumper J33:	installed	TOT input
•Jumper J34:	installed	TOT power supply
•Jumper J35:	installed	TOT output

3.5.2 MT-3 AM Audio Processor Factory Configuration

The MT-3 AM Tx Audio Processor is factory configured as follows:

•Microphone Input:	1kHz tone at -10 dBm gives 50% maximum modulations.
•Audio Balanced Input:	1 kHz tone at -8 dBm gives 90% maximum modulations.
•Automatic Modulation Control	enabled
•Automatic Level Control	enabled

The corresponding jumper settings are:

•Jumper JU1:	'y' position	Automatic Modulation Control enabled
•Jumper JU2:	not installed	Modulation configuration
•Jumper JU3:	'y' position	Automatic Level Control enabled
•Jumper JU4:	not installed	Time-out-time power supply (optional)
•Jumper JU5:	'y' position	Voice application
•Jumper JU6:	'y' position	Voice application
•Jumper JU7:	not installed	Modulation configuration
•Jumper JU8:	'y' position	Automatic Level Control enabled
•Jumper JU9:	installed	Power AMC and Microphone enabled

3.6 MT-3 AM Transmitter Board Alignment

3.6.1 General

Before proceeding with the transmitter alignment, check that the appropriate jumpers are installed. The standard jumper configuration for the Transmitter Main Board, given in section 3.4.1, is normally employed for transmitter alignment. In a standard configuration, the only alignment required on the MT-3 AM Transmitter Main Board for a synthesized transmitter is to set the frequency switches (FSW1, FSW2, FSW3, and FSW4) for the desired channel frequency. FSW1 is the most significant digit of the frequency switches. The switch settings for the desired channel frequency can be found in the channel designation tables. If the transmitter is using a crystal control module, the switch settings are irrelevant.

3.6.2 MT-3 AM Transmitter Board Test Points

TP1:	not used
TP2:	microphone audio
TP3:	microphone PTT WTO; inactive +9.5 Vdc, active 0 Vdc
TP4:	microphone PTT NTO; inactive +9.5 Vdc, active 0 Vdc
TP5:	+9.5 Vdc from backplane connector
TP6:	+9.5 Vdc from front panel board
TP7:	+9.5 Vdc Switched
TP8:	Qualified PTT; inactive +9.5 Vdc, active 0 Vdc: activated by synthesizer
TP9:	synthesizer enable; selected by J18
TP10:	synthesizer bootstrap line; +5 Vdc
TP11:	synthesizer PTT input; inactive +9.5 Vdc, active 0 Vdc
TP12:	audio processor TOT input; inactive +9.5 Vdc, active 0 Vdc
TP13:	audio processor TOT output; inactive +9.5 Vdc, active 0 Vdc
TP14:	audio processor audio output
TP15:	not used
TP16:	not used
TP17:	not used
TP18:	not used
TP19:	audio processor continuous +9.5 Vdc
TP20:	not used
TP21:	audio processor supply +8 Vdc, selected by J7
TP22:	not used
TP23:	synthesizer receive data line; 0 Vdc
TP24:	synthesizer transmit data line; +5 Vdc
TP25:	Q1 collector; inactive 0 Vdc, active +9.5 Vdc
TP26:	U2d output; inactive +9.5 Vdc, active 0 Vdc
TP27:	U1a output (PTT WTO); inactive +9.5 Vdc, active 0 Vdc
TP28:	U1b output (PTT NTO); inactive +9.5 Vdc, active 0 Vdc
TP29:	Q6 collector / Q7 gate; inactive +9.5 Vdc, active 0 Vdc
TP31:	+9.5 Vdc TOT SET
TP32:	+9.5 Vdc TOT RESET
TP33:	+9.5 Vdc BALANCED INPUT
TP34:	+9.5 Vdc BALANCED INPUT

3.7 Module Installation and Removal

Installation of the Enhanced Synthesizer or Crystal Controlled Oscillator module is facilitated by alignment pins on each corner of the module. When the four pins are aligned with their corresponding hole in the Transmitter Main Board, push the module down, taking care to ensure the connector pins on the bottom of the Synthesizer or Crystal Controlled Oscillator module are not bent.

To remove the Enhanced Synthesizer or Crystal Controlled Oscillator module, simply remove the center screw from the module lid and pull the module out. The module should be pulled straight out so that the four alignment pins do not bend or damage the circuitboard.

3.8 MT-3 AM Audio Processor Alignment

3.8.1 General

Verify the standard factory settings for the MT-3 AM Audio Processor as given in section 3.5.2 before beginning the standard modulation adjustment procedure. If the transmitter's channel frequency changes, the audio processor should be realigned to optimize the transmitter's performance. The schematic diagram for the audio processor is shown in section 5.4.2 and the component layout is shown in section 5.4.1.

3.8.2 MT-3 AM Audio Processor Adjustment

****note:** clockwise rotation of controls increase signal levels

- 1) Before adjusting the audio board, confirm that the transmitter frequency is correct.
- 2) Unscrew and slide out the case of the transmitter. Locate the Tx Audio Board.
- 3) Connect the transmitter RF Output to a Radio communications test set.
- 4) Connect the 600 ohm input to the incoming audio (pins B18, Z18). Set the audio frequency to 1 kHz at the desired level of -8 dBm.
- 5) Turn the transmitter on.
- 6) Adjust the pot R16, in order to achieve about 0.700 Vrms at TP4.
- 7) Adjust the pot R14, in order to achieve about 0.200 Vrms at TP8.
- 8) Tune the Audio Adjust pot R1 on the Power Amplifier board to obtain 90% modulation.
- 9) Apply a 1 kHz, -20 dBm input signal and adjust the pot R16 in order to obtain 30% modulation.
- 10) Apply a 1 kHz, -8 dBm input signal, the modulation should be 90%, observe that the distortion of the transmitted signal is within 5.0%.

- 11) Slowly increase the input audio signal level to 5 dBm and observe that the modulation does not go over 100%. This step verifies the correct operation of the ALC .
- 12) Change 13.8Vdc power supply to 10V and then to 17V, the modulation of the output RF signal should remain at the same level of 90% \pm 7% and distortion should be less than 3%. If not, adjust the pot R4 on the Audio Processor Board to achieve this. This step verifies the correct operation of the AMC.
- 13) Repeat steps 7 and 9 if required.
- 14) Supply a 1 kHz, -10 dBm signal to the microphone input. (Note the level restriction of -25 dBm to 0 dBm.)
- 15) Adjust the Microphone Input Level Adjust pot (R1) to achieve 50% of RF signal modulation. Observe that the distortion should be under 5%.
- 16) Turn off the transmitter. Remove the signal source and replace all the screws.

4 TRANSMITTER INTERCONNECT PIN DEFINITIONS

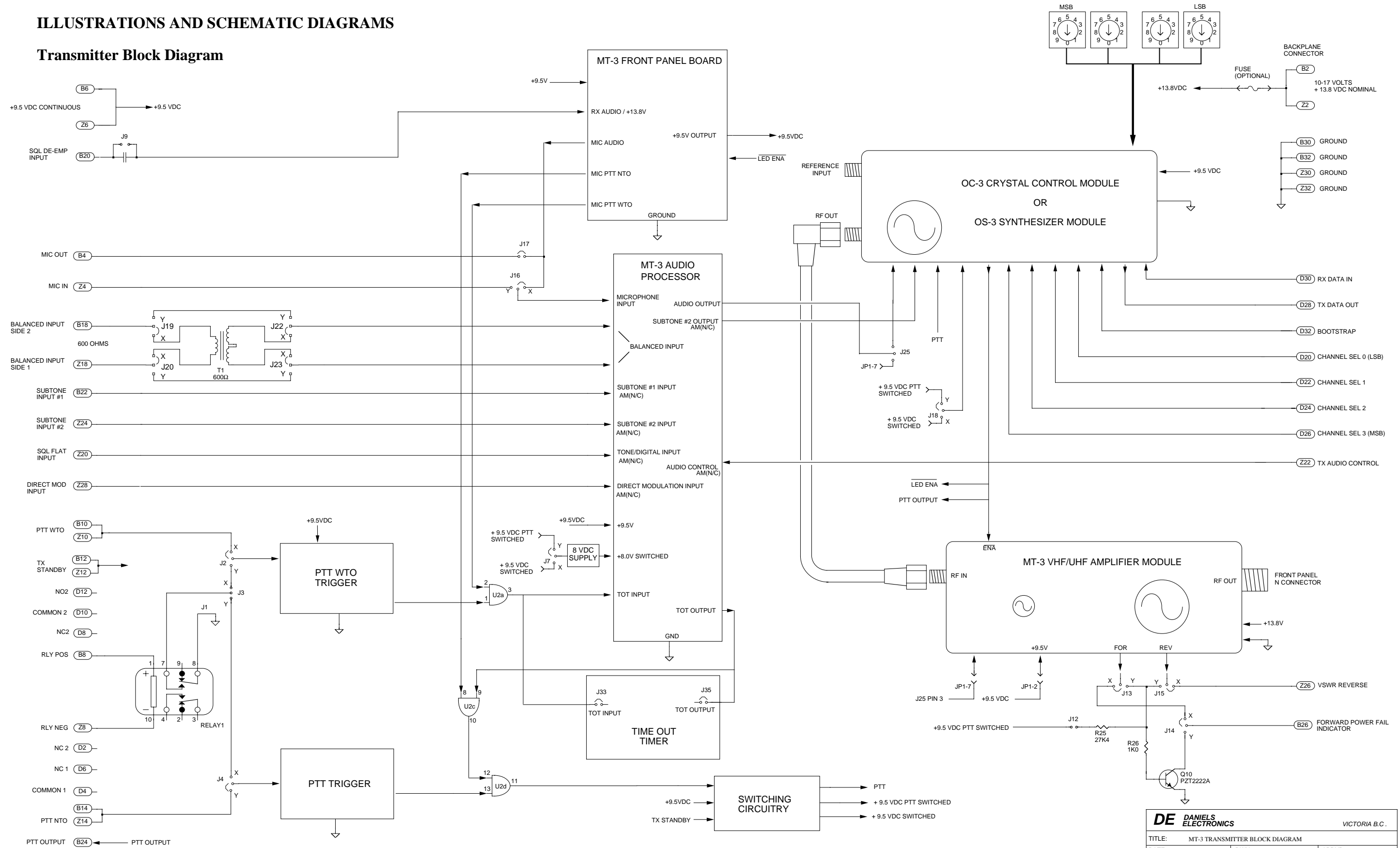
The MT-3 AM series Transmitter employs a 48 pin Eurostandard connector for interfacing to all transmitter power, audio, and control functions. The following are the MT-3 AM series Transmitter backplane connections to the M-3 Motherboard.

Pin	Name	Pin	Name	Pin	Name
D2	N/C	B2	+13.8 Vdc	Z2	+13.8 Vdc
D4	N/C	B4	MIC Out	Z4	MIC In
D6	N/C	B6	+9.5 Vdc	Z6	+9.5 Vdc
D8	N/C	B8	Relay Positive	Z8	Relay Negative
D10	N/C	B10	PTT WTO	Z10	PTT WTO
D12	N/C	B12	Tx Standby	Z12	Tx Standby
D14	N/C	B14	PTT NTO	Z14	PTT NTO
D16	N/C	B16	No Connect (MT-2 +9.5V)	Z16	No Connect (MT-2 +9.5V)
D18	N/C	B18	Balanced Input 2	Z18	Balanced Input 1
D20	Channel Select 0 (LSB)	B20	Squelched,De-emph Audio	Z20	Squelched, Flat Audio
D22	Channel Select 1	B22	Subtone Input 1	Z22	Tx Audio Control
D24	Channel Select 2	B24	PTT Output	Z24	Subtone Input 2
D26	Channel Select 3 (MSB)	B26	Forward Power Sense	Z26	Reverse Power Sense
D28	Synth Tx Data (Output)	B28	Monitor Out	Z28	Direct Mod Input
D30	Synth Rx Data (Input)	B30	Ground	Z30	Ground
D32	Synth Bootstrap (Input)	B32	Ground	Z32	Ground

This Page Intentionally Left Blank

5 ILLUSTRATIONS AND SCHEMATIC DIAGRAMS

5.1 Transmitter Block Diagram

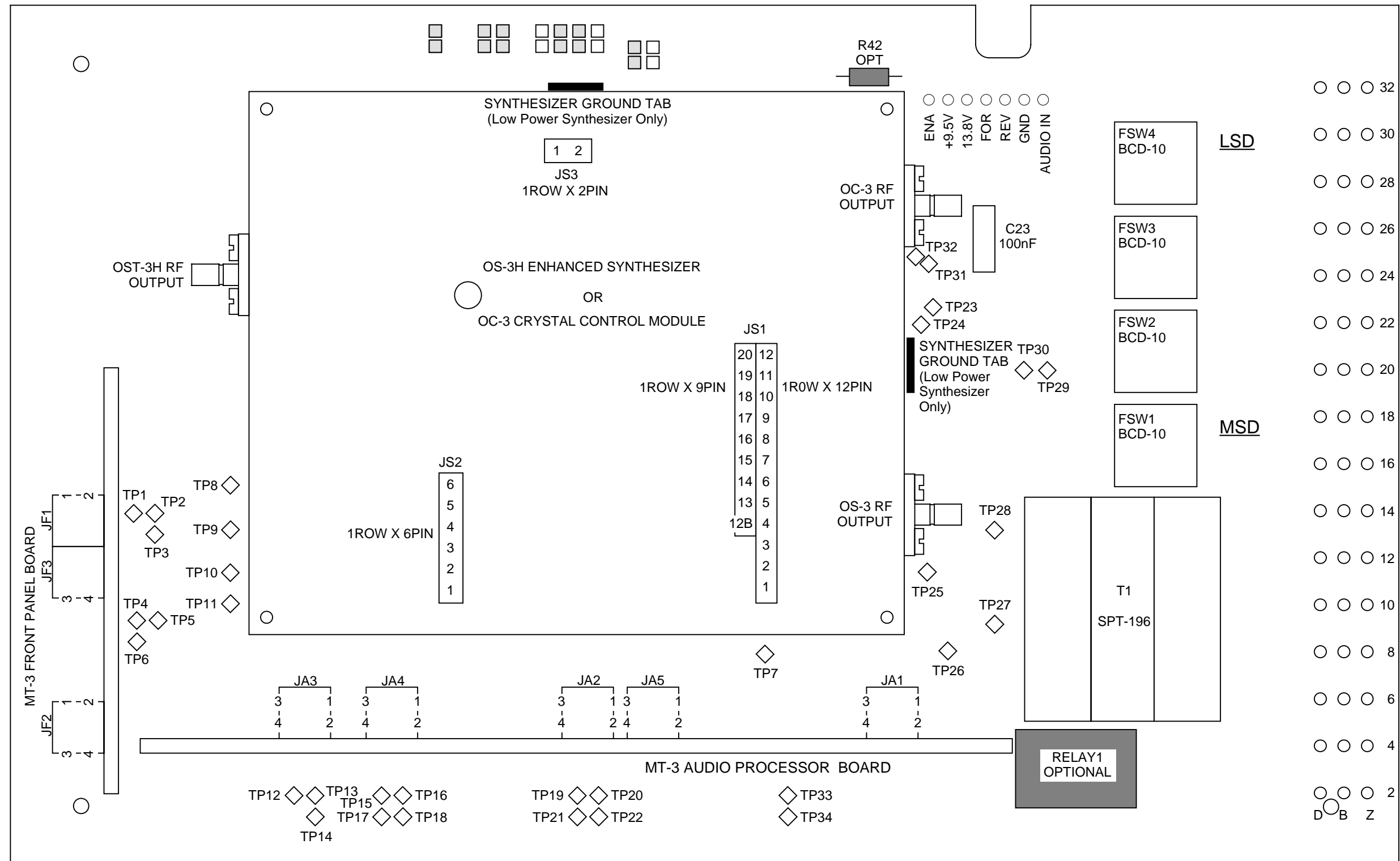


DE DANIELS ELECTRONICS		VICTORIA B.C.
TITLE: MT-3 TRANSMITTER BLOCK DIAGRAM		
DATE: 19 JULY 1994	DWN: SHANE AEBISCHER	APRVD:
DWG No: MT3TXMM1C	DWG REV DATE: 9 OCTOBER 1998	
BOARD NO: 43-920917	BOARD REV: 1.7	

This Page Intentionally Left Blank

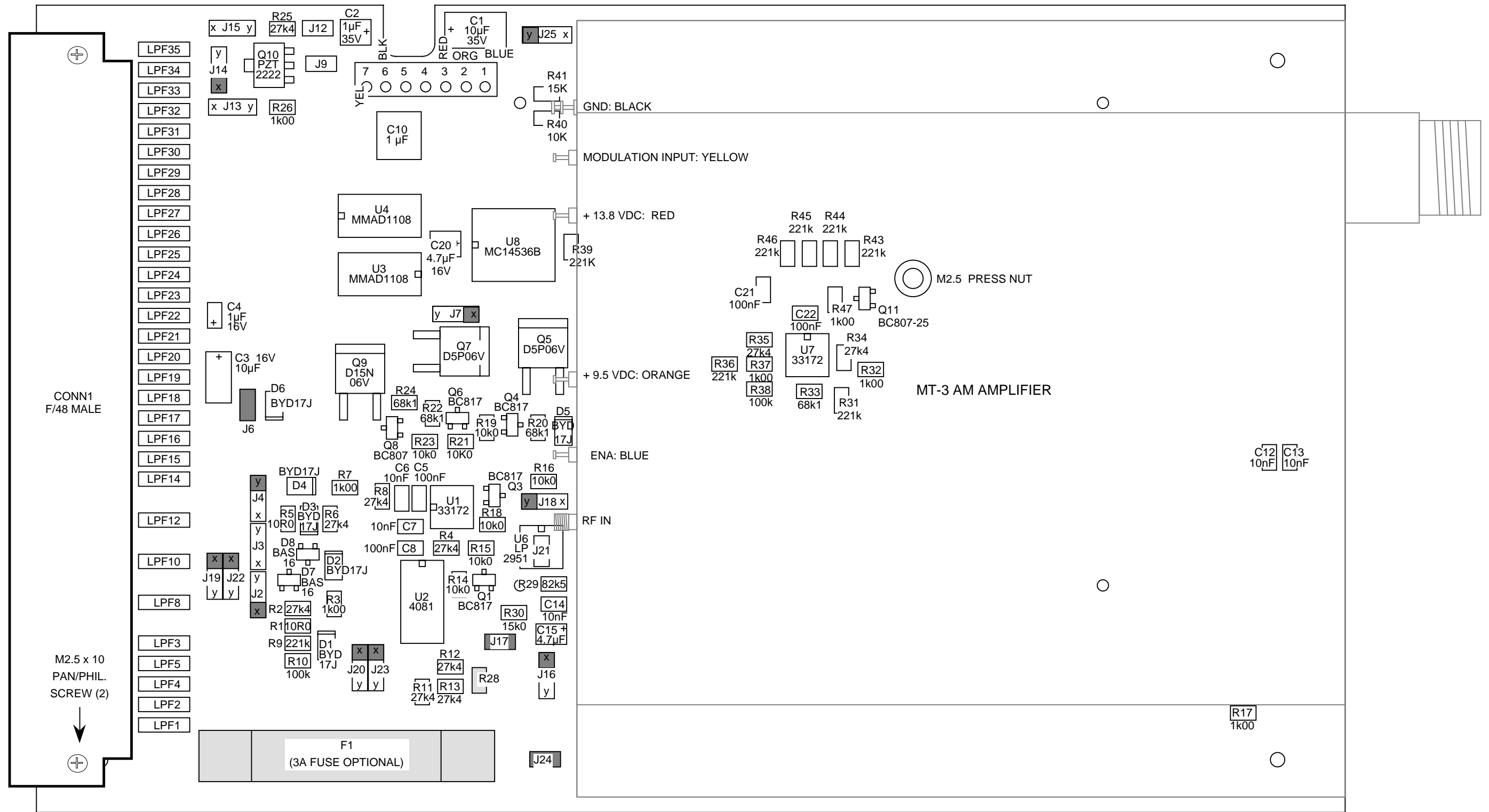
5.2 MT-3 AM Transmitter Board Electrical Assembly

5.2.1 MT-3 AM Transmitter Board Top Side Component Layout



MT3TXMM2B

5.2.2 MT-3 AM Transmitter Main Board Component Layout (Bottom)

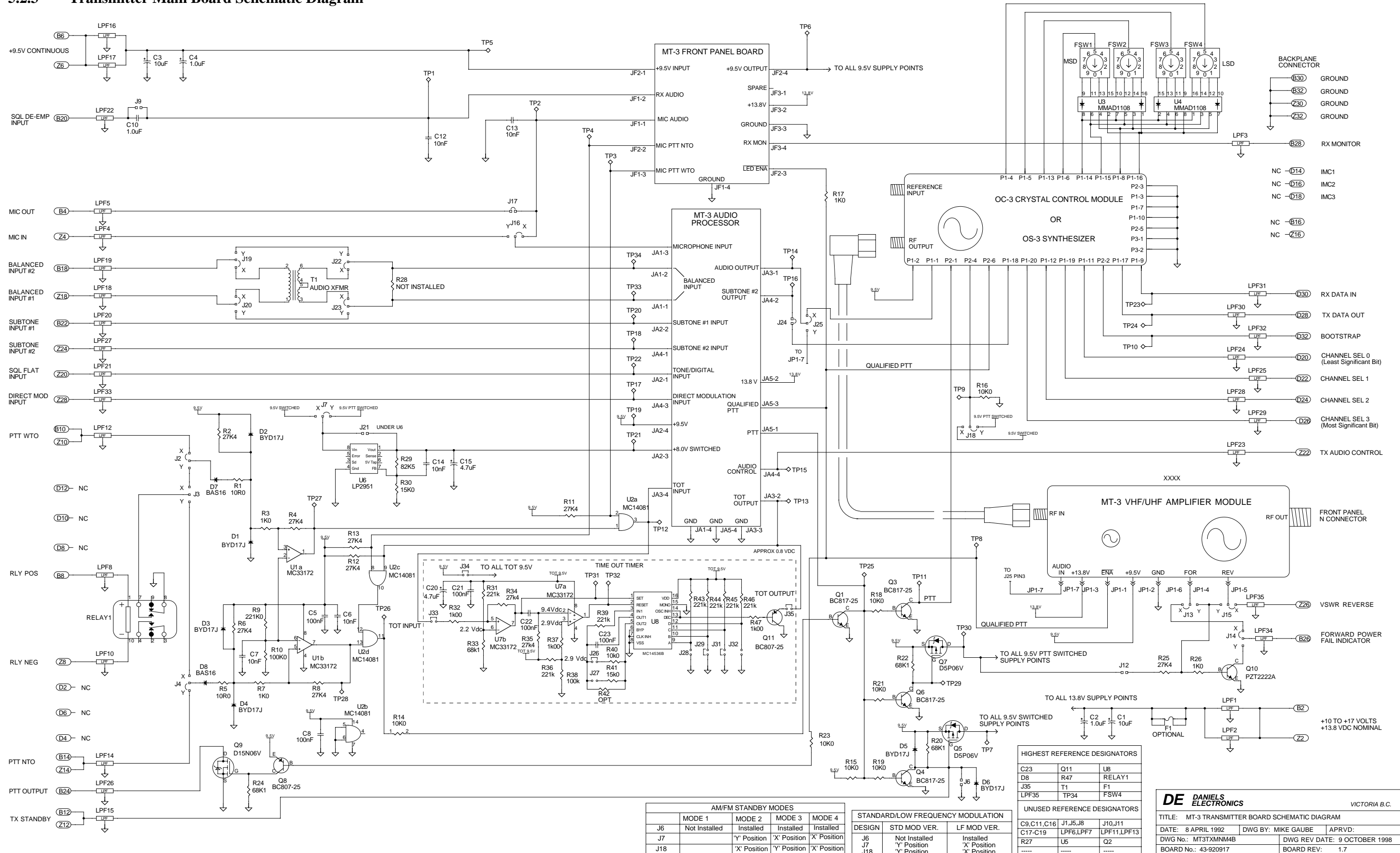


43-920917

- Factory installed jumpers
- Components Not Installed

MT3TXMNM3B

5.2.3 Transmitter Main Board Schematic Diagram



AM/FM STANDBY MODES				
	MODE 1	MODE 2	MODE 3	MODE 4
J6	Not Installed	Installed	Installed	Installed
J7		'Y' Position	'X' Position	'X' Position
J18		'X' Position	'Y' Position	'X' Position

STANDARD/LOW FREQUENCY MODULATION		
DESIGN	STD MOD VER.	LF MOD VER.
J6	Not Installed	Installed
J7	'Y' Position	'X' Position
J18	'Y' Position	'X' Position

HIGHEST REFERENCE DESIGNATORS		
C23	Q11	U8
D8	R47	RELAY1
J35	T1	F1
LPF35	TP34	FSW4
UNUSED REFERENCE DESIGNATORS		
C9,C11,C16	J1,J5,J8	J10,J11
C17-C19	LPF6,LPF7	LPF11,LPF13
R27	U5	Q2
----	----	----

DE DANIELS ELECTRONICS VICTORIA B.C.

TITLE: MT-3 TRANSMITTER BOARD SCHEMATIC DIAGRAM

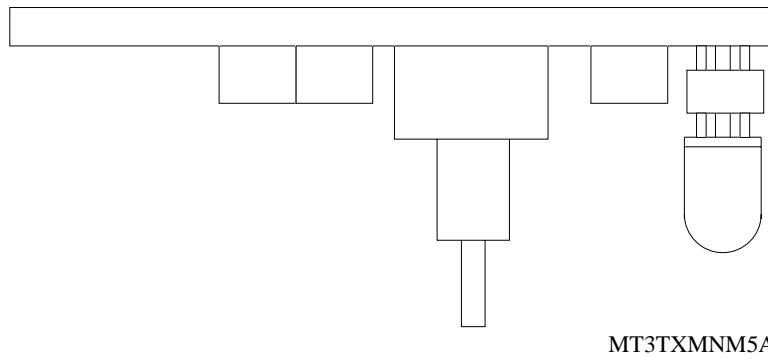
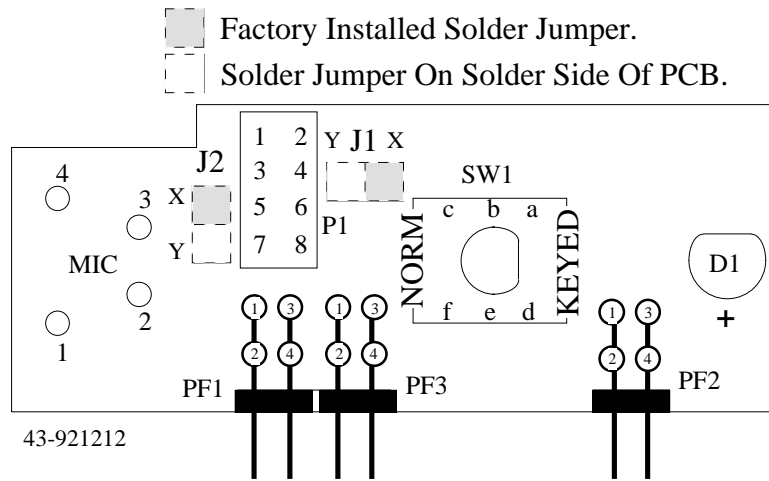
DATE: 8 APRIL 1992 DWG BY: MIKE GAUBE APRVD:

DWG No.: MT3TXMM4B DWG REV DATE: 9 OCTOBER 1998

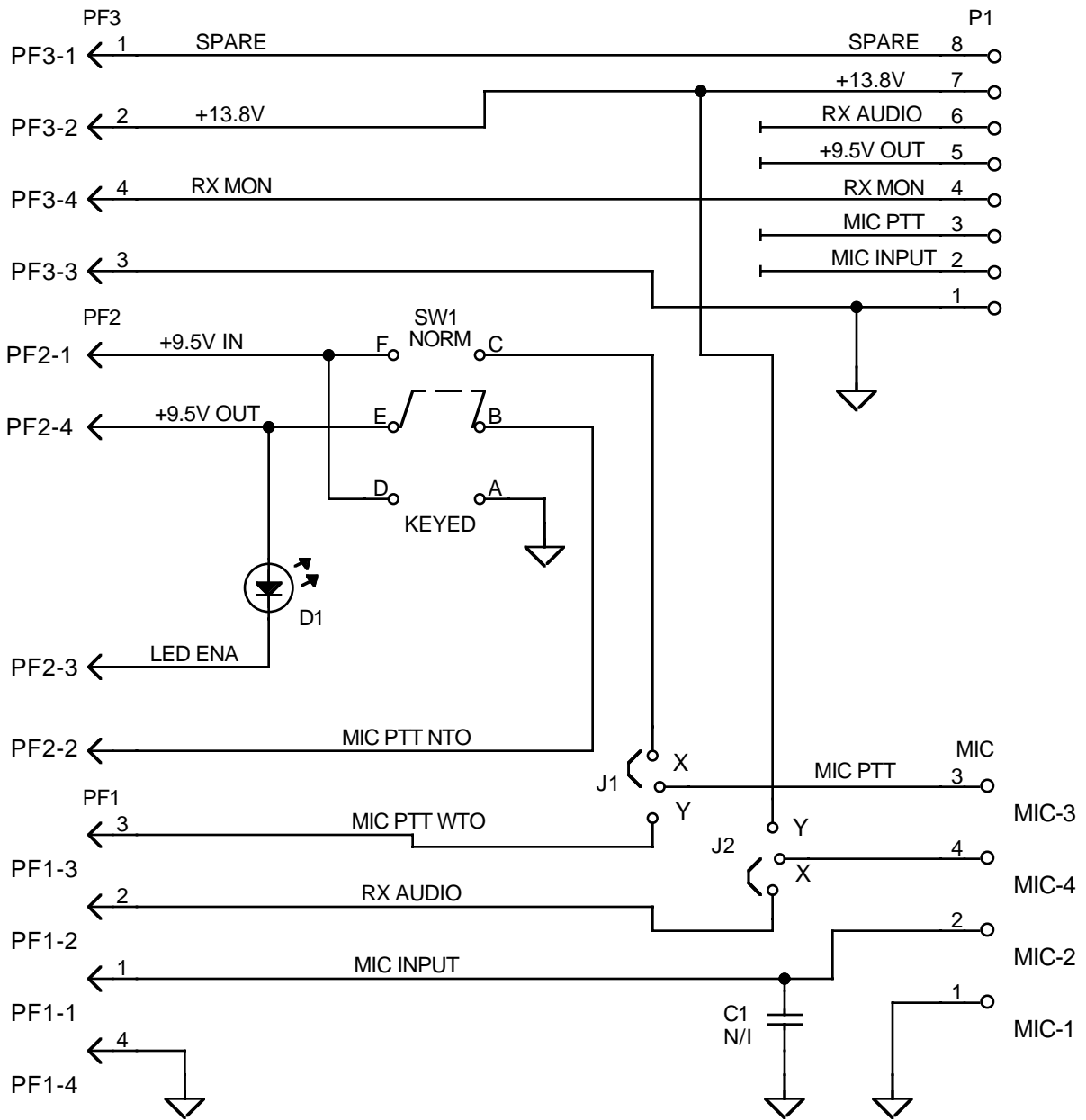
BOARD No.: 43-920917 BOARD REV: 1.7

5.3 MT-3 Front Panel Board

5.3.1 MT-3 Front Panel Board Component Layout



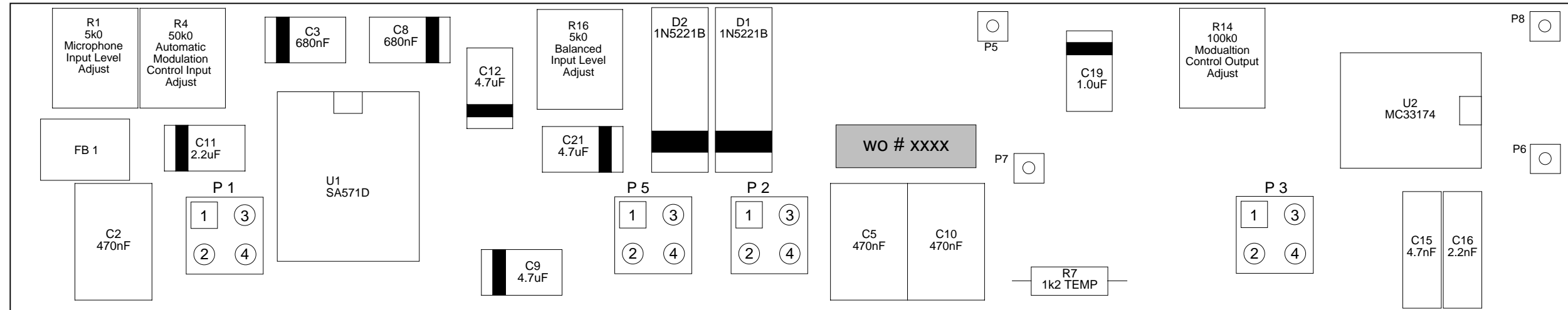
5.3.2 MT-3 Front Panel Board Schematic



DE DANIELS ELECTRONICS		VICTORIA B.C.	
TITLE: MT-3 FRONT PANEL BOARD			
DATE.: 07 APRIL 1992	DWN: M. GAUBE	APRVD:	
DWG No: MT3TXMNM6A		DWG REV DATE: 28 MAY 97	
BOARD NO.: 43-921212		BOARD REV.: 1.2	

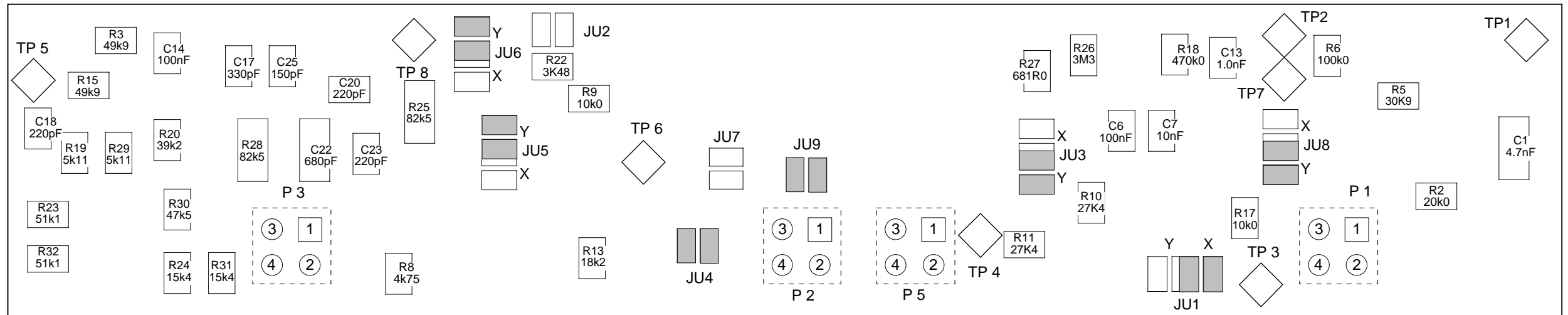
5.4 MT-3 AM Audio Processor Electrical Assembly



5.4.1 MT-3 AM Audio Processor Component Layout



PCB 50049-04

Component Side

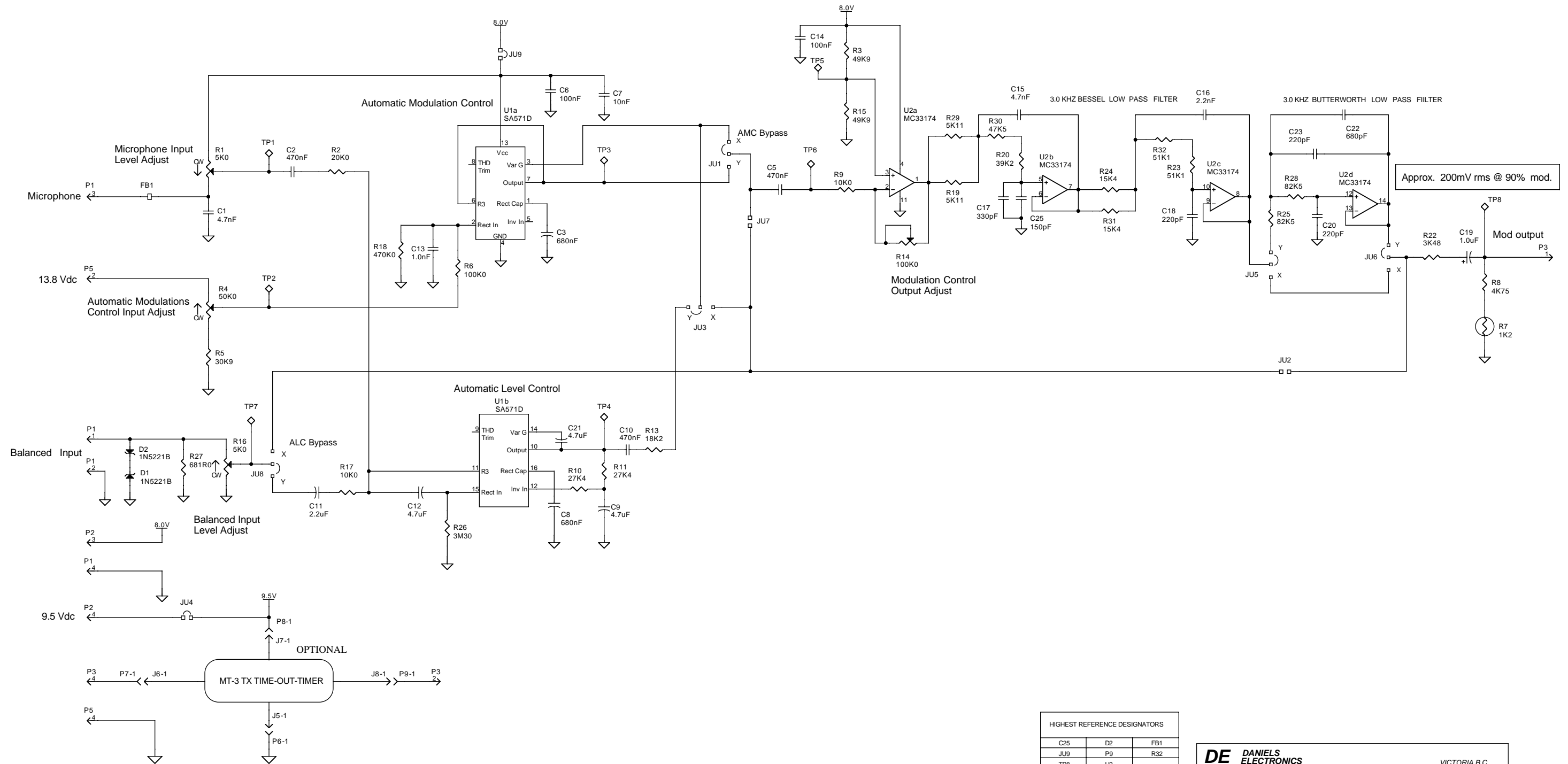


-  - JUMPERS INSTALLED
-  - COMPONENTS NOT INSTALLED

Solder Side

MT3AMTXM8B

5.4.2 MT-3 AM Audio Processor Schematic Diagram

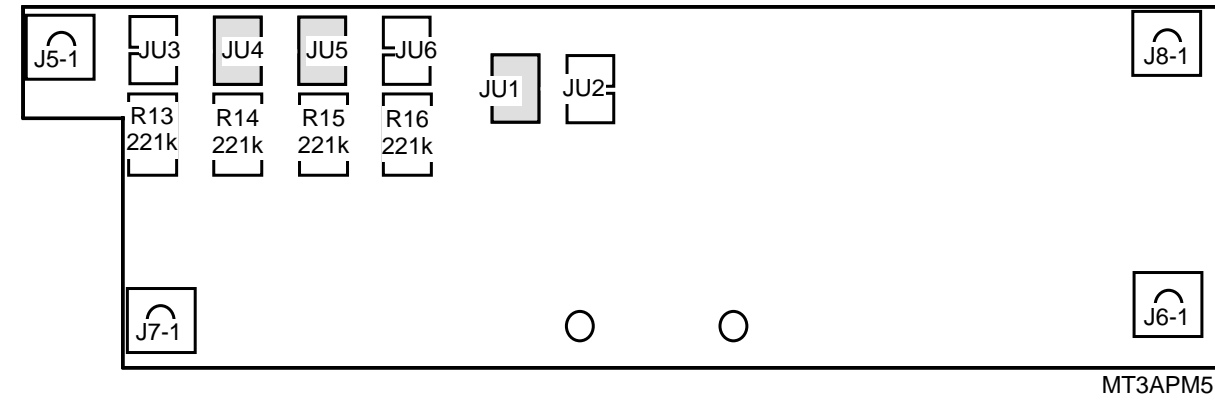
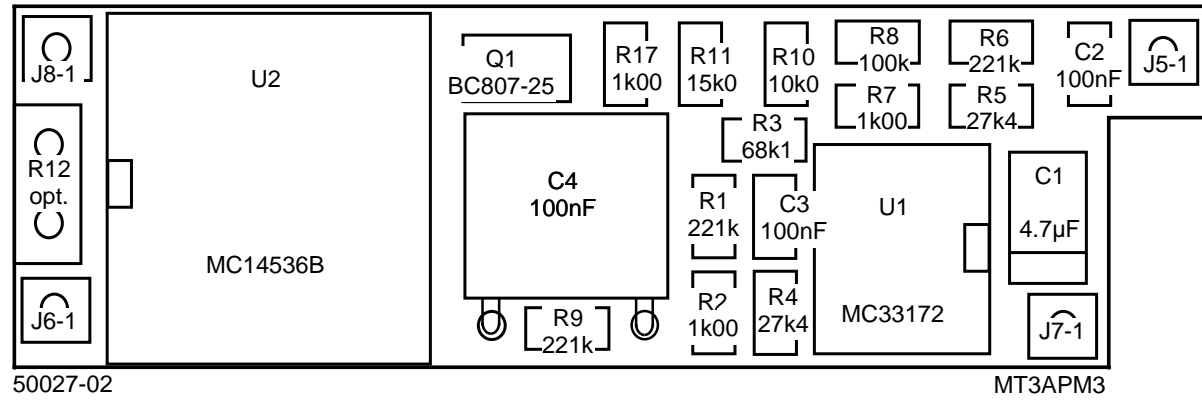


HIGHEST REFERENCE DESIGNATORS		
C25	D2	FB1
JU9	P9	R32
TP8	U2	-----
UNUSED REFERENCE DESIGNATORS		
C4, C24	P4	R12, R21

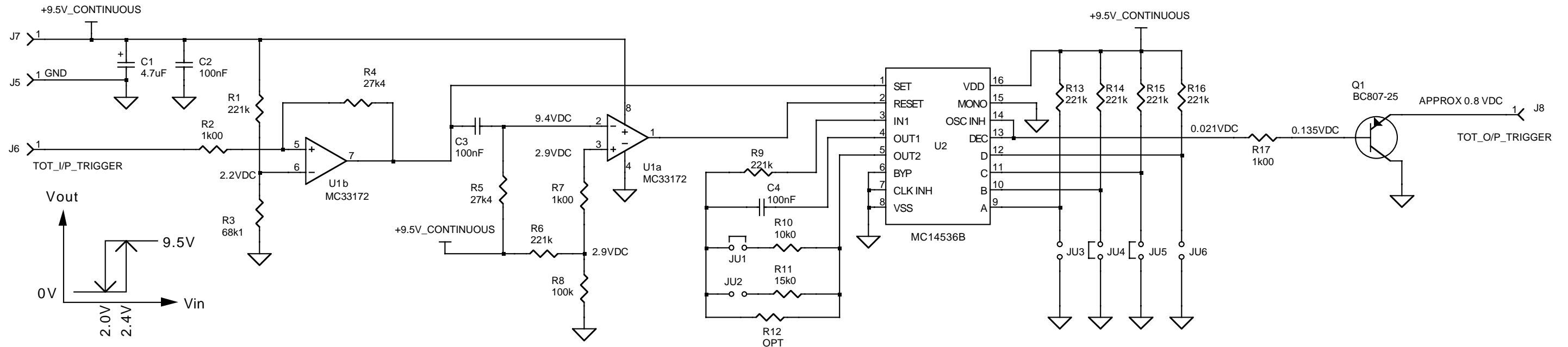
DE DANIELS ELECTRONICS		VICTORIA B.C.
TITLE: MT-3 AM Tx AUDIO BOARD SCHEMATIC DIAGRAM		
DATE: MARCH 1998	DWN BY: STAN POLYAKOV.	APRVD:
DWG No: MT3AMTXM9B	DWG REV DATE: 19 MAY 98	
BOARD No: 50049-04	BOARD REV: 04	

5.4.3 TX Time-Out-Timer Electrical Assembly

5.4.3.1 TX Time-Out-Timer Component Layout



5.4.3.2 TX Time-Out-Timer Schematic Diagram



INSTALL JUMPERS

HIGHEST REFERENCE DESIGNATORS		
C4	J8	Q1
R17	U2	-----
UNUSED REFERENCE DESIGNATORS		
J1-J4	-----	-----

DE DANIELS ELECTRONICS		VICTORIA B.C.
TITLE: MT-3 TX TIME OUT TIMER SCHEMATIC DIAGRAM		
DATE: 19 JANUARY 1996	DWN BY: MICHAEL GAUBE	APRVD:
DWG No: MT3APM4	DWG REV DATE: 16 JANUARY 1996	
BOARD No: 50027-02	BOARD REV: VERSION 0.2	

6 PARTS LISTS

6.1 Transmitter Main Board Parts List

6.1.1 Transmitter Main Board Electrical Parts List

Ref Design	Description	Part No.
C1	CAP, SM, 10uF TANT, 20%, 35V	1055-6D106K35
C2	CAP, SM, 10uF TANT, 20%, 35V	1055-5B105M35
C3	CAP, SM, 10uF TANT, 20%, 16V	1055-6C106M16
C4	CAP, SM, 10uF TANT, 20%, 16V	1055-5A105M16
C5	CAP, SM, 100nF CER, 0805, X7R	1008-5A104K5R
C6	CAP, SM, 10nF CER 0805 X7R 50V	1008-4A103K5R
C7	CAP, SM, 10nF CER 0805 X7R 50V	1008-4A103K5R
C8	CAP, SM, 100nF CER, 0805, X7R	1008-5A104K5R
C10	CAP, SM, 10uF CER/2225 50 X7R	1008-6H105J5R
C12	CAP, SM, 10nF CER 0805 X7R 50V	1008-4A103K5R
C13	CAP, SM, 10nF CER 0805 X7R 50V	1008-4A103K5R
C14	CAP, SM, 10nF CER 0805 X7R 50V	1008-4A103K5R
C15	CAP, SM, 47uF TANT, 10%, 16V	1055-5B475K16
C20	CAP, SM, 47uF TANT, 10%, 16V	1055-5B475K16
C21	CAP, SM100nF CER,0805,X7R,50V	1008-5A104K5R
C22	CAP, SM100nF CER,0805,X7R,50V	1008-5A104K5R
C23	CAP, 100nF FILM, MMK5, 10%, 63V	1016-5A104K63
D1-D6	DIODE, BYD17J RECTIFIER SOD87	2101-BYD17J00
D7	DIODE, BAS16 SWITCHING, SOT23	2100-BAS16000
D8	DIODE, BAS16 SWITCHING, SOT23	2100-BAS16000
F1	FUSE, 3AMP FAST-BLO, 1-1/4 IN.	5604-5GAGC030
FSW1-4	SWITCH, BCD-10 STEPS,5 PIN,PCB	5273-10BCD001
J30	CONNECTOR, F\48_MALE, R\A_P	3720-6048M0RA
LPF1-35	FILTER, SM, LPF1 EM1\LPF, 360pF F	1306-T361F2D5
Q1	TRANSISTOR, BC817-25 NPN SOT23	2120-BC817025
Q3	TRANSISTOR, BC817-25 NPN SOT23	2120-BC817025
Q4	TRANSISTOR, BC817-25 NPN SOT23	2120-BC817025
Q5	MOSFET, D5P06V P-CHAN., DPAK	2144-D5P06V00
Q6	TRANSISTOR, BC817-25 NPN SOT23	2120-BC817025
Q7	MOSFET, D5P06V P-CHAN., DPAK	2144-D5P06V00
Q8	TRANSISTOR, BC807-25 PNP SOT23	2120-BC807025
Q9	MOSFET, D15N06V N-CHAN., DPAK	2144-D15N06V0
Q10	TRANSISTOR, PZT2222A NPN ST223	2120-PZT2222A
Q11	TRANSISTOR, BC807-25,PNP,SOT23	2120-BC807025
R1	RES., SM, 10R0 0805, 1% 100ppm	1150-1A10R0FP
R2	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R3	RES, SM, 1K0 0805, 1% 100ppm	1150-3A1001FP
R4	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP

Ref Design	Description	Part No
R5	RES, SM, 10R0 0805, 1% 100ppm	1150-1A10R0FP
R6	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R7	RES, SM, 1K0 0805, 1% 100ppm	1150-3A1001FP
R8	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R9	RES, SM, 221K0 0805, 1% 100ppm	1150-5A2213FP
R10	RES, SM, 100K0 0805, 1% 100ppm	1150-5A1003FP
R11	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R12	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R13	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R14	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R15	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R16	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R17	RES, SM, 1K0 0805, 1% 100ppm	1150-3A1001FP
R18	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R19	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R20	RES, SM, 68K1 0805, 1% 100ppm	1150-4A6812FP
R21	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R22	RES, SM, 68K1 0805, 1% 100ppm	1150-4A6812FP
R23	RES, SM, 10K0 0805, 1% 100ppm	1150-4A1002FP
R24	RES, SM, 68K1 0805, 1% 100ppm	1150-4A6812FP
R25	RES, SM, 27K4 0805, 1% 100ppm	1150-4A2742FP
R26	RES, SM, 1K0 0805, 1% 100ppm	1150-3A1001FP
R28	RES, SM, NOT INSTALLED 0805, 1% 100ppm	1150-4A1502FP
R29	RES, SM, 82K5 0805, 1% 100ppm	1150-4A8252FP
R30	RES, SM, 15K0 0805, 1% 100ppm	1150-4A1502FP
R31	RES, SM221k 0805, 1%, 100ppm	1150-5A2213FP
R32	RES, SM, 1k00 0805, 1%, 100ppm	1150-3A1001FP
R33	RES, SM, 68k1 0805, 1%, 100ppm	1150-4A6812FP
R34	RES, SM, 27k4 0805, 1%, 100ppm	1150-4A2742FP
R35	RES, SM, 27k4 0805, 1%, 100ppm	1150-4A2742FP
R36	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R37	RES, SM, 1k00 0805, 1%, 100ppm	1150-3A1001FP
R38	RES, SM, 100k 0805, 1%, 100ppm	1150-5A1003FP
R39	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R40	RES, SM, 10k0 0805, 1%, 100ppm	1150-4A1002FP
R41	RES, SM, 15k0 0805, 1%, 100ppm	1150-4A1502FP
R42	RESOPT METAL FILM, 5%,05W	OPTIONAL
R43	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R44	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R45	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R46	RES, SM, 221k 0805, 1%, 100ppm	1150-5A2213FP
R47	RES, SM, 1k00 0805, 1%, 100ppm	1150-3A1001FP
RELAY1	RELAY, 9VDC RELAY 9VDC, 2_FORM_C P	5310-2C09P005
T1	TRANSFORMER, AUDIO XFMR AUDIO 600R 1:1	1280-600P6005
U1	IC, MC33172 DUAL_OP_AMP, SO-	2302-33172N08
U2	IC, MC14081 QUAD_2I\P_AND, S	2375-40810N14
U3	IC, MMAD1108 8_DIODE\ARY. SO1	2331-11080N16
U4	IC, MMAD1108 8_DIODE\ARY. SO1	2331-11080N16
U6	IC, LP2951 PROG._VOLT_REG S	2305-29510N08

Ref Design	Description	Part No.
U7	IC, MC33172 DUAL OP AMP, SO-8	2302-33172N08
U8	IC, MC14536B PROGRAM TIMER, SO-16W	2375-45360W16

6.1.2 Transmitter Main Board Mechanical Parts List

Description	Part No.	Qty.
CABLE, SMB-SMB PLUG, RG316,12cm	\$7910-WP0WP012	1 (Crystal Control)
CABLE, SMA-SMB PLUG, RG188,15cm	\$7910-SP0WP015	1 (Synthesizer)
CABLE, SMA PLUG-PLUG, RG188, 19 cm	\$7910-SP0SP019	1 (Opt. - Synth only)
CONN, TYPE F 48 MALE, RA, PCB MTG	3720-6048M0RA	1
CONN/RF, SMA JACK-JACK BULKHEAD	5118-J875BJ05	1 (Opt. - Synth only)
CASE, 14HP RF PLUG-IN, MT-3 TX	3802-62502010	1
FASTENER, QUICK RELEASE	3702-10000120	4
GASKET, BeCu,3FINGER,,.25",CLIP	5630-12023250	2
HANDLE, FRONT PANEL, 14HP, GREY	3702-10000614	1
HOLE PLUG, 0.25" HOLE, NYLON, BLACK	5671-250N062B	1
LOCKWASHER, M3, SPLIT,A2 STEEL	5814-3M0LK00S	4
MIC CONN, 4 PIN MALE, BLACK	5040-114ST0BK	1
NAMEPLATE, BLANK, 14HP, ALUM.	3702-10001214	1
NUT, M2.5, HEX, 5.0mm, STEEL/Ni	5813-2M5HX50N	2
NUT, M2.5, SQUARE, 5.0mm, ZINC	5813-2M5SQ50Z	2
NUT PRESS, M2.5, 5.6mm OD, PC MNT	5833-T2M55615	1
PANEL/FRNT,W/IDENT:TX-EXTR.VER	3802-61002101	1
PANEL, REAR,POS.4,14HP EXTRSN.	3702-63002101	1
SCREW, M3 x 8, PAN/PHIL, BLACK	5812-3M0PP08T	4
SCREW, M3 x8,OVAL C/S/PHIL,A2	5812-3M0VP08S	4
SCREW, M2.5 X 10, CHEESE/SLOT, A2	5812-2M5CS10S	2
SCREW, M2.5 X 12, FLAT/PHIL, Ni	5812-2M5FP12N	2
SCREW, M3 X 6, OVAL C/S/PHIL, Ni	5812-3M0VP06N	2
SCREW, M3 X 6 PAN/PHIL, A2	5812-3M0PP06S	4
SCREW, M5 X 8 FLAT/PHIL, A2	5812-5M0FP08S	4
TAB, GROUND, MT-3 SYNTH., BRASS	3702-67800905	2 (Synthesizer only)
WIRE, TFE/STRAND., 24AWG, VIOL (13.5 cm)	7121-24S19367	1
WIRE, TFE/STRAND., 24AWG, ORG (12.5 cm)	7121-24S19363	1
WIRE, TFE/STRAND., 24AWG, RED (11.0 cm)	7121-24S19362	1
WIRE, TFE/STRAND., 24AWG, YELLOW (9.5 cm)	7121-24S19364	1

Description	Part No.	Qty.
WIRE, TFE/STRAND., 24AWG, BLACK (9.0 sm)	7121-24S19360	1
WIRE, TFE/STRAND., 24AWG, BROWN (16.0sm)	7121-24S19361	1

6.1.3 MT-3 Front Panel Board Electrical Parts List

Ref Desig	Description	Part No.
D1	LED, RED, 5 mm OD, T-1 3/4	2010-503001RD
PF1	HEADER, 0.1", RA, 2 ROW X 2 PIN	5010-H202RA9T
PF2	HEADER, 0.1", RA, 2 ROW X 2 PIN	5010-H202RA9T
SW1	SWITCH, TOG/DPDT, ON-OFF-ON, PCB/STR	5215-T2031V02
PCB	MT-3 TX FRONT PANEL	4321-40921211

6.2 MT-3 AM Audio Processor Parts List

6.2.1 MT-3 AM Audio Processor Electrical Parts List

Ref Design	Description	Part No.
C1	CAP., SM, 4.7nF CER., 1206, X7R	1008-3B472K5R
C2	CAP., 470nF FILM, MMK5,10%,63V	1016-5D474K63
C3	CAP., SM, 680nF TANT., 10%, 35V	1055-4B684K35
C5	CAP., 470nF FILM, MMK5,10%,63V	1016-5D474K63
C6	CAP., SM, 100nF CER., 0805, X7R, 50	1008-5A104K5R
C7	CAP., SM, 10nF CER., 0805, X7R	1008-4B103K5R
C8	CAP., SM, 680nF TANT., 10%, 35V	1055-4B684K35
C9	CAP., SM, 4.7uF TANT., 10%, 16V	1055-5B475K16
C10	CAP., 470nF FILM, MMK5,10%,63V	1016-5D474K63
C11	CAP., SM, 2.2uF TANT., 20%, 20V	1055-5B225K20
C12	CAP., SM, 4.7uF TANT., 10%, 16V	1055-5B475K16
C13	CAP., SM, 1.0nF CER., 0805, X7R, 50V	1008-3A102K5R
C14	CAP., SM, 100nF CER., 0805, X7R, 50V	1008-5A104K5R
C15	CAP., 4.7nF FILM, MMK5, 10%, 63V	1016-3A472K63
C16	CAP., 2.2nF FILM, MMK5, 10%, 63V	1016-3A222K63
C17	CAP., SM, 330pF CER., 0805,C0G	1008-2A331J1G
C18	CAP., SM, 220pF CER., 0805,C0G	1008-2A221J1G
C19	CAP., SM, 1.0uF TANT., 20%, 35V	1055-5B105M35
C20	CAP., SM, 220pF CER., 0805,C0G	1008-2A221J1G
C21	CAP., SM, 4.7uF TANT., 10%, 16V	1055-5B475K16
C22	CAP., SM, 680pF CER., 1206,C0G	1008-2B681J1G
C23	CAP., SM, 220pF CER., 0805,C0G	1008-2A221J1G
C25	CAP., SM, 150pF CER., 0805,C0G	1008-2A151J1G
D1	DIODE, 1N5221B ZENER 3.9V,DO35	2002-1N5221B0
D2	DIODE, 1N5221B ZENER 3.9V,DO35	2002-1N5221B0
FB1	FERRITE BEAD, SM,FERRITE BEAD 43MIX.,18x.12	1213-43181200

Ref	Description	Part No
P1-P5	HEADER 01", R/A, 2 ROW X 2PIN	5010-H202RA9T
PCB	AUDIO PROCESSOR, VT-3A130	4322-30500494
R1	POT., SM, 5K0 4mm SQ, 11T,SIDE	1174-DM2502J0
R2	RES., SM, 20K0 0805, 1%,100ppm	1150-4A2002FP
R3	RES., SM, 49K9 0805, 1%,100ppm	1150-4A4992FP
R4	POT., SM, 50K0 4mm SQ, 50K, 11T,SIDE	1174-DM3503J0
R5	RES., SM, 30K9 0805, 1%,100ppm	1150-4A3092FP
R6	RES., SM, 100K0 0805, 1%,100ppm	1150-5A1003FP
R7	TEMPSISTOR, 1K2 PTC, 10%,AXIAL	1181-3AGD122K
R8	RES., SM, 4K75 0805, 1%,100ppm	1150-3A4751FP
R9	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R10	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R11	RES., SM, 27K4 0805, 1%,100ppm	1150-4A2742FP
R13	RES., SM, 18K2 0805, 1%,100ppm	1150-4A1822FP
R14	POT., SM, 100K0 4mm SQ, 100K,11T,SIDE	1174-DM4104J0
R15	RES., SM, 49K9 0805, 1%,100ppm	1150-4A4992FP
R16	POT., SM, 5K0 4mm SQ, 11T,SIDE	1174-DM2502J0
R17	RES., SM, 10K0 0805, 1%,100ppm	1150-4A1002FP
R18	RES., SM, 470K0 0805, 1%,100ppm	1150-5A4703FP
R19	RES., SM, 5K11 0805, 1%,100ppm	1150-3A5111FP
R20	RES., SM, 39K2 0805, 1%,100ppm	1150-4A3922FP
R22	RES., SM, 3K48 0805, 1%,100ppm	1150-3A3481FP
R23	RES., SM, 51K1 0805, 1%,100ppm	1150-4A5112FP
R24	RES., SM, 15K4 0805, 1%,100ppm	1150-4A1542FP
R25	RES., SM, 82K5 1206, 1%,100ppm	1150-4B8252FP
R26	RES., SM, 3M30 0805, 5%,200ppm	1150-6A3304JL
R27	RES., SM, 681R0 0805, 1%,100ppm	1150-2A6810FP
R28	RES., SM, 82K5 1206, 1%,100ppm	1150-4B8252FP
R29	RES., SM, 5K11 0805, 1%,100ppm	1150-3A5111FP
R30	RES., SM, 47K5 0805, 1%,100ppm	1150-4A4752FP
R31	RES., SM, 15K4 0805, 1%,100ppm	1150-4A1542FP
R32	RES., SM, 51K1 0805, 1%,100ppm	1150-4A5112FP
U1	IC, SA571D COMPANDOR, SO-16L	2327-SA571D00
U2	IC, MC33174 QUAD OP AMP,SO-14	2304-33174N14

This page intentionally left blank.

7 REVISION HISTORY

ISSUE	DATE	REVISION
-------	------	----------

- | | | |
|---|-------------|--|
| 1 | May 97 | <ul style="list-style-type: none">• First Issue. |
| 2 | March 98 | <ul style="list-style-type: none">• To improve performance and efficiency of the Audio Processor Board. ECO #541.<ul style="list-style-type: none">- C18 was 82pF is now 150pF- R20 was 8k25 is now 3k01- R21 was 1M0 is now not installed- R26 was 470k is now 3M30- Moved SM jumpers to the SM side of the PCB. Moved P1, P2 & P5 to the correct positions. Added land pattern to the PCB for R21. |
| 3 | June 98 | <ul style="list-style-type: none">• Corrected the part number for D1 and D2 on the MT-3 AM Audio Processor Electrical Parts List. |
| | December 98 | <ul style="list-style-type: none">• The Butterworth filter stages were changed to Bessel filters to improve the differetnial group delay of the AM Transmitter. ECO #563.<ul style="list-style-type: none">- The AM Audio Processor PCB was 50049-02 is now 50049-04.• Updated the DE logo and added the statutory notice to the title page. Corrected the drawing numbers on the Transmitter layout and schematic drawing. |

This page intentionally left blank.